

# Sean M. McCuddy

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## SUMMARY OF QUALIFICATIONS

**Multidisciplinary scientist with background in microbiology and geology** and 13 years experience, including extensive field and laboratory work in both disciplines. Innovative problem solver who excels in research-based environments conducting experiments, managing projects, meticulously documenting work, analyzing data and preparing reports. Skilled listener, diplomatic and effective working solo or in teams. Intellectually curious and self-motivated with high ethical standards. *Core strengths include:*

- Environmental microbiology
- Molecular biology techniques
- Antigen production & biodefense research
- Environmental consulting geology
- Data analysis & experimental design
- Quality assurance & quality control
- Scientific, technical & general writing ability
- Financial & laboratory management

**Master of Science** • Geology • New Mexico Institute of Mining & Technology, Socorro, NM • GPA: 3.79  
Thesis: *Phylogeny of Archaea and Bacteria Isolated from Deep South African Gold and Diamond Mines*

**Bachelor of Arts** • Geological Sciences • Albion College, Albion, MI • *summa cum laude* • GPA: 3.85  
Phi Beta Kappa • Sigma Xi • Sigma Gamma Epsilon • J. Harlen Bretz Award

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## PROFESSIONAL EXPERIENCE

CIRIS ENERGY, INC., Centennial, CO

2012 to 2013

### Scientist

Conducted applied research and development using microbiology and molecular biology techniques. Interfaced regularly with other scientists and engineers to solve complex problems concerning bioconversion of coal to natural gas in *in situ* and *ex situ* environments. Devised and executed experiments on microbial degradation of coal and production of methane. Analyzed data and created visualizations and presentations.

- Developed and applied new method for assessing biological activity in raw coal slurries.
- Made major contributions to biodiversity screening project launched to identify microbes possessing metabolic capabilities that might enhance company processes and proprietary technology.
- Isolated aerobic and facultatively anaerobic microbes able to grow on raw coal.
- Used next-generation DNA sequencing data to identify spatiotemporal relationships among groups of bacteria and archaea present in coal seams and linked to corresponding chemical data.
- Determined effects of nutrient amendments and physical coal alteration on microbial utilization of coal.

U.S. DEPARTMENT OF DEFENSE, Dugway Proving Ground, UT

2008 to 2012

### Microbiologist

Produced, characterized and assured quality of bacteria, viruses and toxins used nationwide in biodefense testing and research. Managed Critical Reagents Program Antigen Repository (CRPAR) finances and main laboratory, designed and carried out experiments, compiled and analyzed data, prepared reports, troubleshoot problems and improved processes. Performed all electrochemiluminescence (ECL), infrared spectroscopy and particle size assays. Managed CRPAR during absences of program manager. Wrote, reviewed and edited procedures, test plans, data analysis spreadsheets and other documents.

- By spearheading all quantitative work, made major contributions to CRPAR's achievement of A2LA accreditation under assessment standards ISO Guide 34:2000 and ISO/IEC 17025:2005.
- Established procedures for quantifying major sources of uncertainty in Coulter counter and PCR assays to comply with statistical guidelines described in ISO Guides 34, 35 and 17025.
- Received Secret security clearance and favorable SSBI; eligible for Top Secret/SCI clearance.
- Planned and directed study to determine long-term and short-term stability of CRPAR antigens.

- Developed new methods for growing *Clostridium* species and for purifying *Bacillus* spore preparations.
- Cut FY11 and FY12 budget requests by 18% and 7%, respectively, saving government over \$260,000.

JACOBS TECHNOLOGY, INC., Dugway Proving Ground, UT 2005 to 2008

**Associate Scientist II** (2007 to 2008) • **Associate Scientist I** (2005 to 2007)

Worked as microbiologist in CRPAR. Conducted research; produced and tested antigens using standard microbiological, biochemical and biomolecular techniques; prepared reports and batch records; aggregated, evaluated and managed data; trained new personnel and ran all ECL and Coulter counter assays. Combined and edited weekly activity reports from 7 contractors. Managed CRPAR during absences of program manager.

- Improved CRPAR's ECL immunoassays, protein assays and Coulter counter assays, providing standardized results, more accurate concentrations and metrics facilitating lot-to-lot comparisons.
- Initiated series of sporulation experiments with 9 species of *Bacillus*, resulting in enhanced sporulation for some strains, and led spore germination work on *Bacillus anthracis*, generating new ECL procedure.
- Served as subject matter expert or alternate on 5 of 6 integrated product teams.
- Completed study investigating effect of freeze-thaw cycles on viability and protein concentrations of bacteria, alerting supervisor to problems with CRPAR's inventory management system.
- Awarded Jacobs Dugway Team Employee of the 3rd Quarter, Life Sciences Division, 2007.
- Exceeded yearly safety goal by submitting 72% more Safety Observation Reports than required.

NORTHERN ENVIRONMENTAL TECHNOLOGIES, INC., Northbrook, IL 2003 to 2004

**Geologist**

As environmental consultant, characterized and remediated chlorinated solvent and petroleum contamination and conducted environmental site assessments. Coordinated and led field work: logged and field-screened soil cores; supervised installation of groundwater monitoring wells; developed, sampled and surveyed wells; drew detailed site maps and prepared site health and safety plans. Processed and interpreted field data and laboratory results and wrote technical reports.

- Completed 40-hour OSHA Hazardous Waste Operations and Emergency Response certification.

NEW MEXICO INSTITUTE OF MINING AND TECHNOLOGY, Socorro, NM 2000 to 2003

**Laboratory Technician III** (2003) • **Research Assistant** (2000 to 2002)

Performed field- and laboratory-based research examining microbial life in deep subsurface. Used biomolecular and microbiological techniques to study community structure and metabolisms of microorganisms inhabiting gold and diamond mines in Witwatersrand Basin, South Africa. Spent over 4 months working with team of scientists sampling fissure and borehole water and conducting experiments in mines up to 3.4 km deep. Studied link between microbes present and geochemistry of host waters.

- Successfully cultured bacteria and archaea, some novel, from subsurface waters and identified potentially indigenous deep subsurface microbial community not associated with mining operations.
- Helped design and implement two *in situ* experiments investigating microbial diversity with depth.
- Gained extensive laboratory experience in DNA extraction, PCR amplification of 16S rRNA genes, cloning, RFLP analysis, DNA sequence alignment, phylogenetic analysis and anaerobic microbiology.

ALBION COLLEGE, Albion, MI 1999 to 2000

**Research Assistant** (1999 to 2000)

Contributed to research examining ice-level history at Mount Takahe, West Antarctica, and role of ice sheet in global climate change. Characterized clasts from glacial tills and analyzed volcanic rocks using petrography, X-ray fluorescence spectrometry and  $^{40}\text{Ar}/^{39}\text{Ar}$  dating. Evaluated geochemical data using statistical methods.

Other positions at Albion College: **Geology Tutor** (2000) • **Teaching Assistant** (1999)

STUDENT CONSERVATION ASSOCIATION, Sitka, AK 1998

**Resource Assistant**

Worked on U.S. Forest Service field crew constructing fish ladders in remote Tongass National Forest.